

DIRECT TESTIMONY ON REHEARING

of

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Ameren Illinois Company d/b/a Ameren Illinois

**Verified Petition for Approval of Smart Grid Advanced Metering Infrastructure
Deployment Plan**

Docket No. 12-0244

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Introduction

Q. Please state your name and business address.

A. My name is Eric P. Schlaf. My business address is 527 East Capitol Avenue, Springfield, Illinois, 62701.

Q. Are you the same Eric P. Schlaf who provided testimony earlier in this proceeding?

A. Yes. My testimony was ICC Staff Exhibit 1.0.

Purpose and Summary of Testimony

Q. What is the purpose of your Direct Testimony on Rehearing in this proceeding?

A. I address the issue of the extent to which the introduction of Advanced Metering Infrastructure (“AMI”) meters could result in societal benefits that are associated with customer ownership of Plug-in Electric Vehicles (“PEVs”).

Q. Please summarize your Direct Testimony on Rehearing.

A. I discuss the following in my Direct Testimony on Rehearing:

- 1) AMI allows PEV owners to potentially save money by taking service under a dynamic pricing rate, such as Real-time Pricing (“RTP”) and charging their vehicles during off-peak periods when electric prices are lower than average.
- 2) RTP is already available to all Ameren customers but customers would now pay an extra fee for the interval metering that is required to record hourly usage. PEV owners that are also RTP customers would not have to pay the extra interval metering fee if AMI were already provided to them. The resulting cost savings could be counted as a PEV-related societal benefit.
- 3) I comment on Ameren witness Dr. Ahmad Faruqui’s methodology of estimating PEV-related societal benefits (Ameren Ex. 5.0RH). Dr. Faruqui calculates that some Ameren customers will be induced to purchase PEVs because of the ability

to save money through enrolling in a dynamic pricing rate. I find that Dr. Faruqui's analysis relies on two key assumptions that concern me: (a) projected PEV adoption rates that are subject to a wide variety of expert opinion and (b) an untested relationship between electricity prices and PEV sales.

Q. Does Section 16-108.6 of the Public Utilities Act ("PUA") allow Ameren's cost-benefit analysis to include as societal benefits any potential benefits that may be due to the purchase of electric vehicles?

A. My understanding is that the cost-benefit analysis may include benefits that are due to the "the enabling of greater penetration of alternative fuel vehicles," which presumably include PEVs.

Q. What is the potential relationship between PEVs and AMI meters?

A. PEV owners will likely charge their vehicles primarily during off-peak periods, when electric prices are typically lower than average. To save money compared to the flat rate, PEV owners will need to take service under a dynamic pricing rate, such as real-time pricing. Therefore, one potential connection between PEVs and AMI is that AMI meters will easily enable customers to enroll in a dynamic pricing rate offered by Ameren and/or Retail Electric Suppliers.

Q. Does Ameren currently offer a dynamic pricing rate that would allow customers to charge their PEVs during the off-peak?

A. Yes. Ameren offers RTP to all customers, both residential and non-residential. Ameren offers RTP to residential customers under a program called Power Smart Pricing ("PSP").

Approximately 13,600 customers are taking service under PSP.¹ Thus, it is apparent that a sizable number of Ameren residential customers are aware of and taking advantage of RTP.

Q. What is the status of the Power Smart Pricing program?

A. The Illinois Commerce Commission (“Commission”) is presently reviewing whether PSP should be continued, modified or discontinued (Docket No. 11-0547). At this point in the proceeding, no party is arguing against the continuation of the PSP program largely as it exists today. I also note my understanding that Ameren is statutorily required to offer RTP to all of its customers (Section 16-107 of the PUA).

Q. Do PSP and other RTP customers receive an AMI meter?

A. No. However, RTP customers are furnished with an interval meter that records hourly usage.

Q. Would AMI provide meter-related cost savings for PEV-owners/RTP customers?

A. Yes. My understanding is that Ameren would charge residential RTP customers a fee of \$5.00 to cover interval meter costs.² Providing all Ameren customers with an AMI meter would eliminate this cost.

Q. Using this approach, can you calculate PEV-related societal benefits?

¹ Electric Switching Statistics, available at <http://www.icc.illinois.gov/electricity/switchingstatistics.aspx>, viewed August 22, 2012.

² Docket No. 11-0547, Ameren Ex.1 .0, p. 3, lines 54-55.

67 A. Yes. PEV-related societal benefits could thus be calculated by multiplying \$5 per month
68 * 12 months by the estimated number of PEVs purchased and driven by Ameren
69 customers during the analysis period. For example, supposing that on average Ameren
70 customers purchase 20,000 PEVs annually during 2012-2032, the resulting figure would
71 be \$ 5 per month * 12 months * 20,000 * 20 equals \$ 24 million in total nominal societal
72 benefits.

73 Q. **Do you have remarks about this approach?**

74 A. It is evident that this approach, like Dr. Faruqui's approach discussed below, is dependent
75 on the estimated number of PEVs purchased by Ameren customers. However, as
76 discussed below, at this stage of PEV development, expert opinions differ widely on the
77 prospects for future PEV adoption.

78 Q. **Please summarize this portion of your testimony.**

79 A. The primary benefit for PEV owners that is potentially created through the introduction
80 of AMI -- the opportunity to save money through off-peak charging -- can already be
81 obtained through Ameren's statutorily required offering of real-time pricing. Thus, the
82 potential PEV-related contribution that the introduction of AMI could provide to the cost-
83 benefit analysis is limited to the extent of the interval meter-related cost savings.

84 **Comments on Dr. Faruqui's Estimation of PEV-Related Societal**
85 **Benefits That are Due to AMI**
86

87 Q. **How does Dr. Faruqui approach the analysis of PEV-related societal benefits?**

88 **A.** Dr. Faruqui recognizes that the task of quantifying the relationship between PEVs and
89 AMI is more difficult than simply estimating the number of PEVs and calculating the
90 savings due to operating a PEV compared to a gasoline-powered vehicle. Even if AMI
91 did not exist, and if Ameren customers were only able to take service under flat rates,
92 PEV sales would still take place as the PEV market matures. To calculate societal
93 benefits, Dr. Faruqui undertakes the far more difficult task of estimating the number of
94 PEVs that are purchased by Ameren customers, and the resulting cost savings, that may
95 be due to the introduction of AMI. (Ameren Exhibit 5.0 RH, pp. 12-14, lines 262-307)

96 **Q. Please discuss Dr. Faruqui's analysis.**

97 **A.** Dr. Faruqui uses a long chain of reasoning and calculation to arrive at the figure of
98 \$139.0 million³ of net societal benefits over the benefit period. He starts by estimating
99 the number of PEVs that will be purchased by Ameren customers by 2030. Using a
100 mathematical relationship between gasoline prices and the purchase of hybrid vehicles,
101 he estimates the number of PEVs that are induced by the introduction of AMI meters.
102 His estimate of societal benefits is derived from the gasoline costs that are avoided as
103 customers power their vehicles primarily with electricity, less an offset that is due to
104 increased electric generation. (*Id.*)

105 **Q. Can all of the data used in Dr. Faruqui's analysis be reliably forecasted?**

106 **A.** Several of the numbers that Dr. Faruqui needs to complete his analysis are difficult to
107 forecast, particularly the estimated number of PEVs that will be purchased by Ameren
108 customers, which is a major factor in estimating societal benefits using Dr. Faruqui's

³ Ameren Ex. 5.6RH

methodology or the methodology I described above. For example, in its December 2010 response to the Commission in the Commission's "Initiative on Plug-In Electric Vehicles," Ameren presented three estimates, including its own, of PEV adoption in various future years.⁴ The estimates vary considerably depending on whether adoption is expected to be relatively slow, average, or aggressive.

Q. How much confidence should the Commission place in PEV adoption forecasts?

A. I think the Commission should be cautious in relying on estimates of PEV adoption that are developed as the PEV market is in its infancy, even estimates that are developed by experts. This can be seen in Ameren's projections for PEV adoption. PEV growth has been considerably slower than Ameren projected and will need to rapidly accelerate to meet Ameren's projections for the year 2015. For example, Ameren forecasted a range of 4,387 to 6,647 PEV purchases by the year 2012, while Ameren's forecasted range for 2015 is 42,236 to 64,130 PEV purchases. (Ameren PEV Assessment Report, p. 10) However, the total number of PEVs in Illinois as of mid-2012 is only around 600-700.⁵

Q. How does Dr. Faruqui estimate the number of PEV purchases that are due to AMI meters?

A. Dr. Faruqui states that because he is unaware of any existing data that relates electricity prices to EV sales, he estimated the proportion of PEV sales that are due to AMI meters by an analogous relationship between sales of hybrid vehicles and gasoline prices.

⁴ [Ameren PEV Assessment Report](http://www.icc.illinois.gov/Electricity/PEV.aspx), pp. 5-11, available at <http://www.icc.illinois.gov/Electricity/PEV.aspx>.

⁵ See <http://www.foxillinois.com/news/illinois/Charging-stations-almost-outpace-electric-cars-in-Illinois-148026105.html>, viewed August 24, 2012, which states that there were about 600 registered electric vehicles in April 2012.

(Ameren Exhibit 5.0RH, p. 13, lines 286-284) Research cited by Dr. Faruqui indicates that as the price of gasoline increases by 1% the quantity of hybrid vehicle sales increases by 0.86%; i.e., the sales of fuel-efficient hybrid vehicles are responsive to increases in the price of gasoline. (*Id.*, lines 289-291) Dr. Faruqui reasons that a similar mathematical relationship holds for sales of PEVs and the price of electricity, except that the relationship is reversed; i.e., as electric prices decrease by 1%, PEV sales increase by 0.86%. (*Id.*, lines 291-292)

Q. Please comment on Dr. Faruqui's estimate that PEV sales will increase by 0.86% as electric prices decrease by 1%.

A. Under Dr. Faruqui's methodology, the figure of 0.86% is another important factor in the societal benefits calculation. However, I am doubtful that the 0.86% figure should be relied upon without further research. I can agree that it makes intuitive sense that sales of PEVs should be responsive to electricity prices, at least to some degree. However, as noted by Dr. Faruqui, the strength of this relationship is not yet supported by existing data (*Id.*, lines 286-287). Thus, to the extent that the relationship is actually weaker, the corresponding estimate of societal benefits would be correspondingly diminished.

Q. What are the next steps in Dr. Faruqui's calculation?

A. Citing research published by Dr. Faruqui and his colleagues at the Brattle Group, Dr. Faruqui estimates that off-peak charging could save customers 35% to 64% over charging under flat rates. (*Id.*, pp. 13-14, lines 292-294) Dr. Faruqui then takes 2/3 of the lower figure of 35% to arrive at a savings rate of 23% (i.e., $2/3 * 35\%$). Dr. Faruqui thus estimates that a decrease of 23% in electricity prices due to the availability of dynamic

pricing rates would lead to a 20% increase in PEV sales (i.e., $0.86 * 23\%$). (*Id.*, pp. 13-14, lines 294-302)

Q. Please comment on this step of Dr. Faruqui's analysis.

A. The results of this step are dependent on potential savings due to off-peak charging and, as noted above, the actual relationship between PEV sales and electricity prices.

Q. What is the next step in Dr. Faruqui's calculation?

A. After estimating that 11% of the vehicle fleet in 2030 will be PEVs, Dr. Faruqui estimates that 2.1% of all vehicle sales in 2030 will be PEVs that are due to the introduction of AMI (i.e., $0.2 * 11\%$). The 2.1% figure is halved and then decreased by an additional one-third, resulting in the estimate that 0.7% (i.e., $0.5 * 0.67 * 2.1\%$) of all vehicle sales can be attributed to AMI. (*Id.*, p. 14, lines 301-305) Dr. Faruqui states that the steps of halving the 0.7% estimate and then decreasing that number by additional one-third are done to err on the side of caution. (*Id.*, lines 303- 305)

Q. Please comment on the calculation of the 0.7% figure.

A. Calculating an estimate, then reducing the estimate by one-half, and then a further one-third, indicates that the calculation methodology can produce estimates that are subject to wide variation and judgment.

Q. How does Dr. Faruqui translate the 0.7% figure into the net societal benefit amount of \$139 million?

169 A. Dr. Faruqui's testimony does not carry out the calculation of net societal benefits. My
170 understanding is that Dr. Faruqui multiplies 0.7% by the estimated number of PEVs times
171 estimated avoided gas costs (less additional relevant costs that are due to increased
172 electric generation).

173 Q. **Do you have comments on this step?**

174 A. I agree that under Dr. Faruqui's methodology it would be appropriate to use avoided gas
175 costs as the basis for the calculation of societal benefits.

176 Q. **Are there additional PEV-related societal benefits that could be ascribed to AMI?**

177 A. The introduction of AMI meters could potentially result in several benefits, such as the
178 avoidance of costs related to meter reading and other operational costs. However, it
179 appears that most if not all of these other potential benefits, which are available to all
180 customers with AMI meters, are accounted for elsewhere in the cost-benefit analysis.

181 **Conclusion and Recommendations**
182

183 Q. **Please summarize your Direct Testimony on Rehearing.**

184 A. I present a method of calculating PEV-related societal benefits that result from avoiding
185 interval metering costs. I also comment on Dr. Faruqui's methodology of estimating
186 PEV-related societal benefits. I find that Dr. Faruqui's methodology relies on projections
187 of PEV sales that are inherently difficult to forecast at this early stage in PEV
188 development as well as an untested relationship between PEV sales and electricity prices.

189 Q. **What do you conclude in your Direct Testimony on Rehearing?**

190 **A.** I conclude that amount of the PEV-related contribution to societal benefits is likely to be
191 positive, but less than the level of benefits that Dr. Faruqui calculates.

192 **Q.** **Does this conclude your Direct Testimony on Rehearing?**

193 **A.** Yes, it does.